

## DETAILED ACTION

### *Response to Arguments*

Applicant's arguments have been fully considered but they are not persuasive.

Regarding applicant's argument that the upper electrode does not directly contact the contact hole, buried layer and protective layer, the examiner points out that Fig 1 of Kozaki illustrates the upper electrode to be in contact with contact hole and protective layer. Furthermore, there are two upper electrodes disclosed in the figure, 120 and 122. Both electrodes are metal and function to conduct electricity from a bonding wire to the contact layer to the active layer. Both electrodes are in direct contact with the protective layer. Therefore, the two electrodes can be interpreted as one element, namely upper electrode.

### *Claim Rejections - 35 USC § 102*

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

**Claim 1-23** are rejected under 35 U.S.C. 102(b) as being anticipated by Kozaki (US 2002/00536760).

Fig 1 of Kozaki discloses a laser diode comprising:

1. “a substrate [101];  
a lower material layer [102-105] formed on the substrate [101];  
a resonance layer [106-109] formed on the lower material layer [102-105];  
an upper material layer [110-111] formed on the resonance layer [102-105] and having a ridge at the top;  
a buried layer [162] formed on the upper material layer [110-111] and having a contact hole corresponding to the ridge of the upper material layer; (paragraph 0232)  
a protective layer [164] formed on the buried layer [162] and having a material different from the material of the buried layer, and having an opening corresponding to the contact hole of the buried layer (paragraph 0173); and

an upper electrode [120,122] formed on the protective layer [164] to contact an upper surface of the ridge through the contact hole,

wherein the upper surface of the ridge is planar (there are no curved surfaces on top of the ridge)

such that the upper electrode [120,122] is in direct contact with each of the contact hole, buried layer [162], and protective layer [164].”

2. wherein the lower material layer includes: a first compound semiconductor layer [103] stacked on the substrate [101]; and a lower cladding layer [105] stacked on the first compound semiconductor layer [103].

3. wherein the first compound semiconductor layer [103] is an n-GaN based group III-V nitride semiconductor layer (paragraphs 0065 and 0150).

4. wherein the lower cladding layer [105] is an n-GaN/AlGaN layer (paragraph 0154).

5. wherein the resonance layer further includes:

a lower waveguide layer [106] stacked on the lower cladding layer [105] and having a refractive index larger than that of the lower cladding layer (paragraph 0037);

an active layer [107] stacked on the upper surface of the lower waveguide layer [106] to generate a laser beam; and

an upper waveguide layer [109] stacked on the active layer [107].

6. wherein the refractive indexes of the upper and lower waveguide layers are lower than the refractive index of the active layer (paragraph 0037).

7. wherein the active layer [107] is a GaN based group III-V nitride compound semiconductor layer of  $\text{In}_x\text{Al}_y\text{Ga}_{1-x-y}\text{N}$  where  $0 \leq x \leq 1$ ,  $0 \leq y \leq 1$ , and  $x+y \leq 1$  (paragraph 0065).

8. wherein the upper material layer includes:

an upper cladding layer [110] stacked on the upper waveguide [109] layer and having a ridge (paragraph 0126) and a refractive index smaller than that of the upper waveguide layer (paragraph 0037);

a second compound semiconductor layer [111] formed on the ridge (paragraph 0166).

9. wherein the upper cladding layer [110] is a p-GaN/AlGaN layer (paragraph 0164).

10. wherein the second compound semiconductor layer [111] is a p-GaN based group III-V nitride semiconductor layer (paragraph 0166).

Regarding **claims 11-23**, the arguments applied above to the apparatus described with regards to claims 1-10 are applicable to the method claims as well. In addition paragraphs 0164-0174 recite the fabrication method steps as required by the claims.

***Contact Info***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to MARCIA A. GOLUB whose telephone number is (571)272-8602. The examiner can normally be reached on M-Th 9:30-6 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Minsun Harvey can be reached on 571-272-1835. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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